

CLAIMS

1. A carbon-insertion-type palladium metal wherein an amount of inserted carbon is 0.16 mol or more with respect to 1.0 mol of a palladium metal.

2. A carbon-insertion-type palladium metal wherein a crystal face distance of a (111) face of a palladium metal calculated from a diffraction angle measured by an X-ray diffraction analysis is 2.270 Å or more.

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3. A palladium catalyst comprising the carbon-insertion-type palladium metal according to claim 1 or 2.

4. A palladium catalyst according to claim 3, for preparation of an α,β -unsaturated carboxylic acid.

5. A preparation method of a carbon-insertion-type palladium metal, comprising a step of reducing palladium in a palladium compound in a palladium compound solution in which the palladium compound having a chlorine content of 0 to 300 ppm is dissolved in a solvent.

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6. A preparation method of a carbon-insertion-type palladium metal according to claim 5, wherein the step is performed at -5 to 150°C.

7. A preparation method of a carbon-insertion-type palladium metal according to claim 5 or 6, wherein the solvent is an organic solvent or a mixed solvent of water and an organic solvent.

5 8. A preparation method of a carbon-insertion-type palladium metal according to claim 7, wherein the organic solvent contains at least one selected from a group consisting of carboxylic acids, ketones, and alcohols.

 9. A preparation method of a carbon-insertion-type palladium metal
10 according to any one of claims 5 to 8, wherein reduction in the step is performed by a reducing agent.

 10. A preparation method of a carbon-insertion-type palladium metal according to claim 9, wherein the reducing agent is an olefin having 2 to 6
15 carbon atoms.

 11. A preparation method of a carbon-insertion-type palladium metal according to any one of claims 5 to 10, wherein the carbon-insertion-type palladium metal according to claim 1 or 2 is prepared.
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 12. A preparation method of a palladium catalyst comprising a preparation method of the carbon-insertion-type palladium metal according to any one of claims 5 to 11.

25 13. A preparation method of an α,β -unsaturated carboxylic acid in which an oxidation reaction of an olefin or α,β -unsaturated aldehyde with

molecular oxygen in a liquid phase to prepare an α,β -unsaturated carboxylic acid is performed in the presence of the palladium catalyst according to claim 4.